



Review

## Countermeasures to the problem of accidents to intoxicated pedestrians

T.P. Hutchinson PhD (Senior Research Fellow)\*, C.N. Kloeden BA (Research Fellow),  
V.L. Lindsay BN (Ed) (Research Officer)

*Centre for Automotive Safety Research, University of Adelaide, Adelaide, South Australia 5005, Australia*

---

### ARTICLE INFO

**Article history:**

Received 3 August 2009

Accepted 24 November 2009

Available online 21 December 2009

---

**Keywords:**

Pedestrian safety

Alcohol and road safety

Intoxicated road users

Public drunkenness

Alcohol abuse

---

### ABSTRACT

A substantial part of the pedestrian accident problem arises from intoxicated pedestrians. Possible countermeasures are reviewed, organised into: (a) prevention of high levels of intoxication in pedestrians, (b) minimising pedestrian activity in the intoxicated, and (c) minimising risk of injury among intoxicated pedestrians. It is concluded that improved safety of intoxicated pedestrians is most likely to come about by making the environment safer for all pedestrians, drunk or sober. The measure that would be expected to have the greatest effect quickest is a reduced speed limit, especially in locations where traffic is busy and there are many pedestrians.

© 2009 Elsevier Ltd and Faculty of Forensic and Legal Medicine. All rights reserved.

---

### 1. Introduction

It has been known for decades that a substantial part of the pedestrian accident problem arises from intoxicated pedestrians. The present paper, based on parts of our recent report,<sup>1</sup> selectively reviews this subject, concentrating on possible countermeasures. It will be concluded that there is no reason for optimism about directing safety measures specifically at drunk pedestrians. In most respects, improved safety of drunk pedestrians will come about by making the environment safer for all pedestrians, drunk or sober. Reduced speed limits (and enforcing them) is likely to be the most effective measure.

The importance of intoxication in injured pedestrians has been known at least since the studies of Heise<sup>2</sup> in Uniontown, Pennsylvania, and Gonzales and Gettler<sup>3</sup> in New York City. The later study by Haddon et al.<sup>4</sup> on adult pedestrians fatally injured in Manhattan has become regarded as a classic. This is because it used a case-control method: for each case, the researchers recruited four pedestrians on the same day of week and at the same time of day, and made a comparison of the case series and the control series. In the case series, 32% had a BAC (blood alcohol concentration) of at least 0.150, as compared with 3% of the controls. Haddon et al. (p. 672) concluded that "The case series was comprised of two substantially discrete groups each of which had an increased risk of fatal involvement, namely, a group of the elderly whose blood either contained no measurable amounts of alcohol, or relatively

little, and a group of the middle-aged who had been drinking heavily".

What are the reasons why alcohol predisposes pedestrians to accident involvement?

- These are well known in their general features<sup>5</sup>: perceptual, cognitive, and physical skills (including detecting vehicles in motion, integrating multiple sources of information, and initiating actions) are all adversely affected. It also seems likely that a very high BAC sometimes leads to a positive attempt at suicide or at least to utter indifference to one's own survival. And situational factors are relevant, in that drunk pedestrians may be on the streets at times when it is dangerous for other reasons (darkness; high speed traffic).
- In contrast to the general reasons for the dangers of alcohol being well known, Oxley et al.<sup>5</sup> (p. 259) also considered that "there is very little research-based evidence detailing the effect of alcohol on specific skills required to cross roads safely". In a simulator-based road crossing experiment, Oxley et al. found that an appreciable proportion of people whose BAC was at least 0.070 accepted a gap of only 1 s. This is consistent with evidence from interviewing injured pedestrians: McLean et al.<sup>6</sup> (p. 20) noted that four out of five pedestrians in their sample who had a BAC of at least 0.010 recalled having noticed the headlights of an approaching car, but then mistakenly attempted to cross.

Cairney and Coutts<sup>7</sup> discussed 240 pedestrian fatalities in Australia between 1999 and 2002, using information in the ATSB (Australian Transport Safety Bureau) Coronial Database. They

\* Corresponding author. Tel.: +61 8 8303 5997; fax: +61 8 8232 4995.  
E-mail address: [paul@casr.adelaide.edu.au](mailto:paul@casr.adelaide.edu.au) (T.P. Hutchinson).

highlighted the following: overrepresentation of male victims, overrepresentation of indigenous persons, night and weekend occurrence, very high BAC's (80% exceeded 0.150), long period of drinking, a large number of cases in which the pedestrian was sitting or lying on the road (40%), and the frequent co-occurrence of other drugs (18%). They regarded these features as in line with previous literature. Ref. 8 is a fuller report on the same dataset. At p. 118 of this, some information is given about a modified sample that excluded persons recorded as indigenous (mostly from the Northern Territory or Western Australia). A notable difference is that the proportion of cases in which the pedestrian was lying on the road was less than half what it was in the total sample. (The figures given are 8% and 21%. However, these percentages are artificially low, in that they are based on the total deaths including those for which pedestrian behaviour was not known.) Cairney and Coutts<sup>7</sup> made seven recommendations, relating to road authority action plans and road safety research, Responsible Serving of Alcohol Programs, publicity aimed at patrons, publicity aimed at drivers, traffic engineering treatments outside drinking establishments, programs aimed at disadvantaged groups in the community, and continued monitoring of alcohol-affected pedestrian fatalities. These recommendations seem appropriate to us, but it is questionable how effective these measures would be. Writing from Brisbane, Lang et al.<sup>9</sup> (Section 1) say, "Alcohol-impaired pedestrian crashes continue to present a challenge to road safety practitioners because there are few known effective countermeasures and due to the difficulty of measuring and modifying behaviour in this area". From Vancouver, Wilson et al.<sup>10</sup> say there are few available proven countermeasures and that legislative approaches "may have little preventative value because of the high proportion of chronic or severe alcohol abusers among pedestrian casualties". In the case of motorists impaired by alcohol, it is possible to imagine fitting alcohol interlocks in all new cars, and thereby achieving a technological solution, but nothing comparable is practicable for pedestrians.

Countermeasures to the intoxicated pedestrian problem have been classified by Alexander et al.<sup>11</sup> (p. 43) and Brooks<sup>12</sup> (p. 116) as follows: prevention of high levels of intoxication in pedestrians, minimising pedestrian activity in the intoxicated, and minimising risk of injury among intoxicated pedestrians. The discussion below will be organised in this way. The publications that will be drawn upon include Refs. 7, 8, 13, 14 and others. Our view of this literature is that it gives no cause for optimism about the problem.

## 2. Prevention of intoxication

This will be discussed under the following headings: chronic alcohol abuse, occasional abuse of alcohol, licensed premises, and public health messages. Concerning licensed premises, see also Section 3.1 (transport from licensed premises) and Section 4.3 (traffic engineering close to licensed premises). For public health messages, see also Section 4.1.

### 2.1. Chronic alcohol abuse

The high alcohol levels in pedestrians killed and injured suggest they drink much too much alcohol. Without going into the issue of whether they should be termed alcoholics, it is plain that many of them have a long-term habit of abusing alcohol. Prevention and treatment of alcoholism and alcohol abuse must be on the list of possible strategies for preventing pedestrian accidents.

Many forms of treatment are effective to a useful degree, including various forms of psychotherapy, self-change manuals, and some pharmacological interventions such as naltrexone and acamprosate (which are thought to work by different mecha-

nisms). See, for example, Raistrick et al.<sup>15</sup> (Chapter 3) and Bergmark.<sup>16</sup> The encouraging data does, however, refer to people who access the medical system. According to the Australian *National Alcohol Strategy 2006–2009*<sup>17</sup> (p. 26), "The low uptake of some proven treatment options for alcohol dependence, such as early and brief interventions and pharmacotherapy for alcohol dependence, despite their proven effectiveness is an issue. Brief interventions are known to be effective in early detection and prevention of alcohol-related health problems".

### 2.2. Occasional abuse of alcohol

"Most of the harm that stems from intoxication is associated with the many people who do not generally drink excessively but occasionally drink to intoxication". That quotation is from p. 38 of Loxley et al.<sup>18</sup> Those authors highlight as effective the following law enforcement interventions against alcohol: increase price through taxation, hypothecated taxes on alcohol to fund treatment and prevention programs, restrict trading hours, responsible alcohol service, provided such programs are accompanied by visible enforcement, restrictions on price discounting, licensee codes of conduct (provided they are accompanied by enforcement), licensing restrictions in indigenous communities, declaration of indigenous communities as dry.

At the level of the individual, there is evidence (e.g., a review by Moyer et al.<sup>19</sup>) of fairly small, but worthwhile effects of brief interventions given by health professionals to non-treatment-seeking samples.

### 2.3. Licensed premises

Drunk pedestrians often get that way at a pub or club. Potentially, this is a point at which intervention could take place: in many jurisdictions, it is an offence to serve alcohol to an intoxicated person, and it might be practicable to both train bar staff better and to enforce the law much more vigorously.

Jeffs and Saunders<sup>20</sup> described an experiment in which enforcement was substantially increased (to a level of two or three visits by uniformed police per week to each licensed premises) at an English seaside town in the summer. That study has been widely discussed: see, for example, Elliott<sup>21</sup> and McIlwain and Homel.<sup>22</sup>

Considerations of civil liability could also be an incentive: if duty of care of a licensee extended to their customers' safety as pedestrians, the customers and also the insurers of drivers in collision with them might make financial claims on the grounds of contributory negligence (see Hamad,<sup>23</sup> especially p. 31).

Intervention requires detection: Perham et al.<sup>24</sup> give some data, collected in Cardiff, on the relationship between BAC and the probabilities of three behavioural indicators of drunkenness (staggering gait, glazed eyes, and slurred speech): a probability of 0.50 of having a staggering gait occurred at a BAC of 0.186, for example.

### 2.4. Public health messages

Government often wants to get social and health messages over to its population, and thereby change behaviour. However, there is quite a substantial body of opinion, based on evaluations of individual campaigns, that advertising and education campaigns will not usually improve behaviour. For example, according to Strecher et al.<sup>25</sup> (p. 35), "One-size-fits-all mass media interventions that run independently of other strategies have demonstrated little or no behavioural improvement". In the context of alcohol misuse, Alexander et al.<sup>11</sup> (p. 49) comment that "Mass media education, in isolation, has generally not been effective in changing behaviour", and DeJong<sup>26</sup> makes a qualified recommendation specifically against fear appeals, as being difficult to execute and rarely succeeding.

On the other hand, we should draw attention to the enormous changes in some attitudes that seem to have occurred over the past 30 years—less tolerance of smoking, drink-driving, and speeding, for example. It is likely that most people will say that public health messages played a part in this.

### 3. Minimising pedestrian activity by the intoxicated

The headings in this section will be: licensed premises, policing of public drunkenness, and should it be an offence to have too high a BAC in public?

#### 3.1. Licensed premises

Staff of licensed premises can encourage the friends of intoxicated people to look after them and see them home safely, or can call a taxi. There may be some scope for locating bus stops and taxi ranks close to pubs and clubs. Licensed premises could provide a minibus to drive customers to and from their home, thus presumably reducing the traffic risk. There are a variety of ways of organising transport for intoxicated people (Graham,<sup>27</sup> pp. 635–637); the chief aim is usually to prevent drink-driving, but prevention of drink-walking is desirable, too.

#### 3.2. Policing of public drunkenness

Possibly the police could more readily intervene to protect someone from themselves who is observed drunk on the street. It is not likely that taking care of drunks is an activity that is popular with the police, but the lack of many other ideas means this has to be listed. In some jurisdictions, public drunkenness is an offence, and in others it is not an offence but police may take a drunk into custody and take him or her home or to a police station or a sobering up centre.

It sometimes happens that the drunk pedestrian is seen behaving irresponsibly in the minutes before the accident. However, cases investigated at-scene in-depth and the text field in routine police reports indicate that this is the exception rather than the rule—that is, there usually is little opportunity for a stranger to intervene. Moreover, alcohol pedestrian crashes are highly dispersed geographically.

Increasing video surveillance of public places is making detection of drunken behaviour increasingly feasible. It is far from clear how behaviour in public and relations between police and public will develop in coming years, as surveillance continues to increase.

#### 3.3. Should it be an offence to have too high a BAC in public?

By analogy with drink-driving legislation, it is likely that the most effective way to get drunk pedestrians off the roads would be to make it an offence to be walking around with too high a BAC, and to permit the police to administer random breath tests to enforce this. It is questionable whether the public would support legislation that made having too high a BAC in public a criminal offence. It is not impossible, though: drunkenness in public is an offence itself in some jurisdictions, and offences based on BAC are now familiar in the laws against drink-driving. Alexander et al.<sup>11</sup> (p. 47) raised the possibility. More recently, Hawks<sup>28</sup> has advocated such a law, on similar logic to passive smoking legislation, and the idea has been cited approvingly by Kypri et al.<sup>29</sup> Romanus<sup>30</sup> urges researchers not to dismiss measures as politically impossible.

Naturally, if such a legislative change were to be considered, the question would immediately arise of what is too high a BAC.

- Harris<sup>31</sup> (p. 141) gives attention to the possibility of making it an offence to be walking in or near traffic in an extreme state of intoxication, by which she means having a BAC of 0.150 or greater. Alexander et al.<sup>11</sup> (p. 47) also had that figure in mind.
- In the context of a licensee's responsibility not to supply liquor to a person in a state of intoxication, a parliamentary committee<sup>14</sup> recommended that a legal definition of intoxication be established. They do not suggest a specific number, but they are firm that it should be less than 0.150 (see p. 74 of their report). On the other hand, until quite recently, 0.080 has been the limit for drivers, who put others at much greater risk than pedestrians do. It seems reasonable to presume that, had the Road Safety Committee been pressed, they would have specified a number lower than 0.150 and higher than 0.080: perhaps 0.110 or 0.120 (halfway between). In its response to the Committee, the Government of Victoria<sup>32</sup> were against defining intoxication in terms of BAC. This was partly on the grounds that intoxication refers to an effect (on a person's mental and physical faculties, and behaviour) rather than to a BAC, and partly on the grounds of the practical difficulties for licensees and police.
- In the US state of Texas, it is an offence to have a blood alcohol concentration of 0.080 or more while in a public place.<sup>33</sup>

It is possible that there would be support for a BAC limit of 0.150, even if there were not for 0.080.

### 4. Minimising risk of injury

There will be four headings in this section: public health messages, information about crash locations, traffic engineering, and pedestrian conspicuity.

#### 4.1. Public health messages

It is desirable to promote awareness among drivers that pedestrians might be drunk and awareness among pedestrians that their judgment may be impaired (see Recommendation 8 of Ref. 13). As already discussed, campaigns often have no detectable effect on crashes, but it is possible that there is an eventual gain in knowledge of dangers by the public, and a shift in attitudes and behaviours.

#### 4.2. Information about crash locations

Knowing crash locations is basic to traffic engineering. It seems likely that information about accidents to drunk pedestrians could be better used in three ways.

- Information enables attention to be paid to where accidents to drunk pedestrians have happened in the past. Because BAC is often unknown, the whole topic of trying to keep drunk pedestrians safe may have been relatively neglected.
- Information may permit description of the types of site where such accidents have happened in the past, and therefore are likely to happen in the future. The great majority of sites of drunk pedestrian accidents do not have more than one such accident per year. Direct use of such data to identify dangerous sites is likely to fail. Instead, it may be more feasible to describe the characteristics of such sites—for example, on arterial roads, and close to licensed premises.
- However, it may be that the surroundings of a crash site are not well described in routine data. Recent improvements in integrating different geographical databases with the crash database may permit greater utilisation of data on, for example, land use.

### 4.3. Traffic engineering

Some methods of improving facilities for pedestrians have been promoted on the basis that they will improve the safety of drunk pedestrians. Such facilities include fencing to channel pedestrians to cross the road at particular locations, short cycle times at traffic signals, and quick response of signals to pedestrian demand. They are likely to improve the safety of all pedestrians, whether or not they have been drinking. In this broader context, Retting et al.<sup>34</sup> (p. 1462) highlighted the following: "Highly effective countermeasures include single-lane roundabouts, sidewalks, exclusive pedestrian signal phasing, pedestrian refuge islands, and increased intensity of roadway lighting".

It is indeed likely that attention to details of traffic engineering has an important part to play in road safety. Too much should not be expected of this strategy, however. There is some degree of geographical concentration of drunk pedestrian accidents (at places where there is much traffic, fast traffic, many pedestrians, and licensed premises), but this degree of concentration is not great.

In relation to concentration of accidents close to licensed premises, we should note that in their Australian series of 240 intoxicated adult pedestrian fatalities, Cairney et al.<sup>8</sup> (p. 109) found that "In almost half the cases where the location of the collision could be specified in relation to the drinking venue, it was immediately outside the venue". However, this refers to 23 cases out of only 52 for which the distance from the drinking venue was known. It is possible that knowing the location of the collision in relation to the drinking venue is strongly associated with the accident being immediately outside the venue—if so, it may be that in few of the other 188 cases was the accident immediately outside the venue.

The measures that will most improve the safety of drunk pedestrians are the same as those that will most improve the safety of sober pedestrians: speed limits that are lower than at present and that are enforced more strictly, and perhaps improvements to street lighting. (Street lighting that is considered good is not necessarily good enough—the time needed to correctly perceive something unexpected, e.g., to perceive a shadow on an artificially illuminated road surface as a pedestrian lying there, and react appropriately may be seconds longer than in sunlight.) However, in the context of people lying on the road, Cairney et al.<sup>8</sup> (p. 109) were sceptical of the potential of improved lighting, on the grounds that the crash locations are widely dispersed. Matters of detail such as minimising visual obstructions and surface irregularities that the pedestrian might trip on are worth attention, too.

### 4.4. Pedestrian conspicuity

High conspicuity of the pedestrian is desirable. It is worth encouraging, for example, the wearing of retro-reflective markings on clothing at night. High conspicuity is desirable whether the pedestrian is sober or drunk, but is particularly important at night, and thus of particular relevance to drunk pedestrians.

However, the conspicuity or ease of detection of an object is a many-faceted concept,<sup>35</sup> and the type of visual performance of the driver that should be measured in order to predict visual aspects of driving performance is only poorly understood.<sup>36</sup> In many of the cases for which pedestrian conspicuity might be relevant, the pedestrian's actions may be utterly surprising to the driver (remaining stationary in the road, or behaving erratically).

## 5. Conclusion from the literature

Undoubtedly there are problems of alcohol abuse and of pedestrian accidents, and there is overlap of these in the problem of

drunk pedestrian accidents. There are good reasons to attack both the problem of alcohol abuse and that of pedestrian accidents, but optimism about directing countermeasures specifically at drunk pedestrians would not be justified.

We believe this to be not an original conclusion, but one that is implicit in the literature that we have seen, even though it is not spelled out in quite this way. Overall, we view the literature as being fairly pessimistic, in the sense of presenting the drunk pedestrian problem as a difficult one, and suggesting that the effect of countermeasures on the total number of pedestrian accidents would be quite limited in size. A possible exception is a statutory limit on blood alcohol level in public places, accompanied by enforcement.

### Conflict of Interest

None declared.

### Acknowledgements

This study was funded by the Motor Accident Commission (South Australia) through a Project Grant to the Centre for Automotive Safety Research. The Project Manager at MAC was Ross McColl. The Centre for Automotive Safety Research receives core funding from both the South Australian Department for Transport, Energy and Infrastructure and the South Australian Motor Accident Commission. The views expressed are those of the authors and do not necessarily represent those of the University of Adelaide or the funding organisations.

### References

1. Hutchinson TP, Kloeden CN, Lindsay VL. Accidents to intoxicated pedestrians in South Australia. Report 061, Centre for Automotive Safety Research, University of Adelaide; 2009.
2. Heise HA. Alcohol and automobile accidents. *J Am Med Assoc* 1934;103:739–41.
3. Gonzales TA, Gettler AO. Alcohol and the pedestrian in traffic accidents. *J Am Med Assoc* 1941;117:1523–5.
4. Haddon W, Valien P, McCarroll JR, Umberger CJ. A controlled investigation of the characteristics of adult pedestrians fatally injured by motor vehicles in Manhattan. *J Chronic Dis* 1961;14:655–78.
5. Oxley J, Lenné M, Corben B. The effect of alcohol impairment on road-crossing behaviour. *Transport Res Part F* 2006;9:258–68.
6. McLean AJ, Brewer ND, Sandow BL. Adelaide in-depth accident study 1975–1979. Part 2: pedestrian accidents. Report from the road accident research unit (now the Centre for Automotive Safety Research), University of Adelaide; 1979.
7. Cairney P, Coutts M. Behaviour patterns associated with fatal crashes involving intoxicated pedestrians—an analysis of the ATSB Coronial Database, 1999–2001. Presented at the Road Safety Research, Policing and Education Conference, held in Sydney; 2003. <<http://www.rsconference.com/pdf/RS030022.pdf>>.
8. Cairney P, Stephenson W, Macaulay J. Preventing crashes involving intoxicated pedestrians. Stage 2—an analysis of Australian coronial records, 1999–2001. Austroads research report AP-R260/04. Sydney: Austroads; 2004. p. 63–119.
9. Lang CP, Tay R, Watson B, Edmonston C, O'Connor E. Drink walking: an examination of the related behaviour and attitudes of young people. Presented at the Road Safety Research, Policing and Education Conference, held in Sydney; 2003. <<http://www.rsconference.com/pdf/RS030022.pdf>>.
10. Wilson J, Fang M, LeBrun D. Locations for collisions involving alcohol and drug impaired pedestrians in urban areas. In: ICTCT-extra workshop (held in Vancouver), international cooperation on theories and concepts in traffic safety; 2003. <<http://www.ictct.org/workshops/03-Vancouver/Wilson.pdf>>.
11. Alexander K, Cave T, Lytle J. The role of alcohol and age in predisposing pedestrian accidents. Pedestrian accident project report no. 6. Report GR/90-11, Roads Corporation, Victoria, Australia; 1990.
12. Brooks C. Alcohol speed and pedestrian safety. In: Smith KP, Aitken BG, Grzebieta RH, editors. *Proceedings of the conference on pedestrian safety*. Canberra: Panther Publishing & Printing, and Australian College of Road Safety; 1998. p. 111–21.
13. Austroads. *Alcohol-impaired pedestrian crashes*. Sydney: Austroads; 1998.
14. Road Safety Committee, Parliament of Victoria. *Walking safely. Inquiry into the incidence and prevention of pedestrian accidents*. Melbourne: Victorian Government Printer; 1999. <http://www.parliament.vic.gov.au/rsc/walking/walking%20safely.pdf>.

15. Raistrick D, Heather N, Godfrey C. *Review of the effectiveness of treatment for alcohol problems*. London: National Treatment Agency for Substance Misuse; 2006. <<http://www.nta.nhs.uk>>.
16. Bergmark A. On treatment mechanisms—what can we learn from the COMBINE study? *Addiction* 2008;103:703–5.
17. Ministerial Council on Drug Strategy. National Alcohol Strategy 2006–2009; 2006. <<http://www.alcohol.gov.au/internet/alcohol/publishing.nsf/Content/nas-06-09>>.
18. Loxley W, Toumbourou JW, Stockwell T. The prevention of substance use, risk and harm in Australia: a review of the evidence. Summary; 2004. <[http://www.health.gov.au/internet/main/publishing.nsf/Content/health-pubhlth-publication-mono\\_prevention-cnt.htm](http://www.health.gov.au/internet/main/publishing.nsf/Content/health-pubhlth-publication-mono_prevention-cnt.htm)>.
19. Moyer A, Finney JW, Swearingen CE, Vergun P. Brief interventions for alcohol problems: a meta-analytic review of controlled investigations in treatment-seeking and non-treatment-seeking populations. *Addiction* 2002;97:279–92.
20. Jeffs B, Saunders W. Minimizing alcohol related offences by enforcement of the existing licensing legislation. *Br J Addict* 1983;78:67–77.
21. Elliott B. Can we rely on deterrence theory to motivate safe road user behaviour? In: *Proceedings of the annual conference of the Australasian college of road safety*, Pearce, ACT, ACRS; 2008. p. 216–34. <<http://www.acrs.org.au/srcfiles/Elliott.pdf>>.
22. McIlwain G, Homel R. Sustaining a reduction of alcohol-related harms in the licensed environment: a practical experiment to generate new evidence. Report from the Key Centre for Ethics, Law, Justice & Governance, Griffith University, Brisbane; 2009.
23. Hamad A. The intoxicated pedestrian: tortious reflections. *Tort Law Rev* 2005;13:14–39.
24. Perham N, Moore SC, Shepherd J, Cusens B. Identifying drunkenness in the night-time economy. *Addiction* 2007;102:377–80.
25. Strecher VJ, Bauermeister JA, Shope J, Chang C, Newport-Berra M, Giroux A, Guay E. Interventions to promote safe driving behaviour: lessons learned from other health-related behaviours. In: *Behavioural research in road safety 2006, sixteenth seminar*. London: Department for Transport; 2006. p. 28–38.
26. DeJong W. The role of mass media campaigns in reducing high-risk drinking among college students. *J Studies Alcohol, Suppl* 2002;14:182–92.
27. Graham K. Preventive interventions for on-premise drinking: a promising but underresearched area of prevention. *Contemp Drug Probl* 2000;27:593–668.
28. Hawks D. Why not a statutory blood alcohol level for drinking in public places? *Addiction* 2006;101:609.
29. Kyppri K, Paschall MJ, MacLennan B, Langley JD. Intoxication by drinking location: a web-based diary study in a New Zealand university community. *Addict Behav* 2007;32:2586–96.
30. Romanus G. Don't prejudge what is "politically possible". *Addiction* 2004;98:1366–7.
31. Harris A. Intoxicated pedestrians. Discussion of possible behavioural interventions. In: Smith KP, Aitken BG, Grzebieta RH, editors. *Proceedings of the conference on pedestrian safety*. Canberra: Panther Publishing & Printing, and Australian College of Road Safety; 1998. p. 134–43.
32. Government of Victoria. Government response to the report of the road safety committee of parliament on the incidence and prevention of pedestrian accidents; 2000. <[http://www.parliament.vic.gov.au/rsc/government\\_responses/PedestrianAccidents.pdf](http://www.parliament.vic.gov.au/rsc/government_responses/PedestrianAccidents.pdf)>.
33. Texas Alcoholic Beverage Commission. TABC cracks down on public intoxication in an effort to reduce DWI's. <http://www.tabc.state.tx.us/pubinfo/pressreleases/2005/20050826.htm> [accessed 26.08.05].
34. Rettig RA, Ferguson SA, McCart AT. A review of evidence-based traffic engineering measures designed to reduce pedestrian-motor vehicle crashes. *Am J Public Health* 2003;93:1456–63.
35. Langham MP, Moberly NJ. Pedestrian conspicuity research: a review. *Ergonomics* 2003;46:345–63.
36. Wood JM, Owens DA. Standard measures of visual acuity do not predict drivers' recognition performance under day or night conditions. *Optom Vis Sci* 2005;82:698–705.